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from another in taking their positions. It requires about five months to train an elephant. We practice from 6 o'clock in the morning until 6 o'clock in the evening. They are drilled singly, and then in squads, and then taught their various "specialty" acts and tricks. Elephants are more imitative than any other animal perhaps, and are very cunning. While practicing they are looking out for an opportunity to "cut up," and will reach back and kick the trainer, and then look as innocent as a truant school-boy. They seem almost human enough to talk. The importation of elephants has increased tenfold within the past decade. Ten years ago very few circuses had more than three or four elephants, and one was the usual number; now, no circus is complete without fifteen or twenty.—*Exchange*.

THE CHIMPANZEE IN CONFINEMENT.—At the Zoölogical Gardens, Philadelphia, are two interesting individuals of this species. Although they are comparatively young, perhaps not older than six years, yet they have an extremely antiquated appearance. I heard a countryman say to a bystander that he "guessed they were 70 years old, easy." One of them has such a great fondness for an old blanket that he carries or drags it with him wherever he goes. Even if he desires to climb to the extreme top of his cage, the blanket must go along, although it greatly retards his progress. He knows its use, but does not always use it judiciously. Thus, on an oppressively hot day in July, I have seen him reclining for twenty minutes or more, entirely enveloped in the blanket, with the exception of his face, looking at the spectators with a comical and pouting expression. I saw one, when teased and disappointed by its keeper, throw itself upon the floor, and roll and scream vehemently, very like a naughty child in a tantrum. A board shelf was placed across their cage for them to climb upon. This they soon found could be used as a spring-board, and nothing seems to give them more pleasure than, when there is a good audience, to steal gently to the center of the board, grasp it tightly with all fours, and spring violently up and down, causing the board with themselves to vibrate rapidly, and producing at the same time a loud, jarring noise. They then seem to greatly enjoy the startled and amused looks of the spectators. Perhaps one of their most human actions is languidly to recline, and holding a straw in one hand, listlessly to chew at its tip, while the eyes are rolled vacantly around. It may be that they are then building "castles in Spain."—*C. F. Seiss, in Scientific American*.

ANTHROPOLOGY.¹

THE PRECURSOR OF MAN.—At the meeting of the French Association at Rouen, last year, the section of anthropology made an excursion to Thenay, near Blois, to study the question of Tertiary man. The digging was performed under the direction of

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MM. d'Ault-Dumesnil and F. Daleau. In a small volume, prepared by le Marquis de Nadaillac, and distributed among the members, entitled: "Notice sur Blois et les environs;" a chapter of fourteen pages is devoted to the silex of Thenay. In greeting the congress M. le Sénateur Dufay discarded the term "Tertiary man," and spoke without apology of the *Anthropopithecus*, a name invented by M. G. de Mortillet. The succession of beds, as revealed by Abbé Bourgeois, is as follows:

A. Vegetable mold.....	0.60 ^m
B. Shell marl, mass of marine fossils.....	0.40
C. Beds of fresh-water calcareous deposits, with <i>Pholas</i> excavations in the upper portion.....	0.32
D. Fresh-water white marls, foliated, flint rare.....	0.75
E. Bed of fresh-water limestone.....	0.25
F. Marls as in D, silex rare.....	1.15
H. Bed of clay, with calcareous nodules and bones of <i>Acero-</i> <i>therium</i>	0.24
I. Marls as in D, silex rare.....	0.92
K. Foliated marls, darker and containing numerous flints broken and retouched.....	0.60

The flints brought to light reveal not only the effect of working, but the influence of fire. This past phenomenon M. G. de Mortillet discusses at length, in *l'Homme*, 1884, p. 550. Now with these facts clearly stated the next duty is to study them dispassionately. The *Anthropopithecus* must be fairly treated. On the one hand there is nothing sacred about him, and he may have to be knocked on the head; on the other hand, he is not, *per se*, as a rival of "Tertiary man," to be hustled off the wharf.

INTERNATIONAL GEOGRAPHICAL EXPOSITION.—At the seventh National Congress of French Geographical Societies to be held in Toulouse in next August, will be organized an international exposition, of which the fifth section relates to anthropology. M. E. Cartailhac will have charge of this section, of which the following is an outline:

- I. *Anthropology*.—Crania, skeletons, tissues; figures and busts, especially with reference to races.
- II. *Demography*.—Statistical studies of peoples; graphic methods, charts, copies of works.
- III. *Prehistory*.—Human remains, relics; charts, books, objects, prints, *et similia*.
- IV. *Ethnology*.
- V. *Glossology*.
- VI. *Instrumentalities*, of research and instruction.

Considerable space has been given to these programmes because the time has come to give to our science a more restricted definition in the use of terms and the classification of objects. In other words, we ought to know what terms to apply and what arrangements to make of our specimens, to exhibit and to describe them. The NATURALIST will open its anthropological department for the discussion of these two ideas, the meaning of words and the best methods of classifying. The last point will include the number and relative importance of classific concepts as well as the method of separating and studying materials.

TURNER'S SAMOA.—Readers of books often wish that authors would so concentrate their writing as to tell just what we want to know and not one word more. This is unreasonable; but, on the other hand, most authors write a great deal that is never quoted by anybody. Twenty-three years ago George Turner published his celebrated work, *Nineteen Years in Polynesia*, in which he mingled his experiences as a missionary with accounts of the natives that our greatest anthropologists were never tired of quoting. In the volume now before us the ethnographic matter has been extracted, much new matter has been added, and the whole has been so arranged and indexed as to constitute a text book on Polynesia of the highest order. Dr. E. B. Tylor endorses the work in an appreciative preface. The first two chapters relate to the Samoan group and the traditions of their origin and names; the third, fourth and fifth to the religion and the gods of the natives. The rest of the chapters take up the general subject in the following order. The people: infancy, childhood and adult years; food, cooking, liquors; clothing; amusements; mortality, longevity, diseases; death and burial; houses; canoes; articles of manufacture; government and laws; wars; the heavens and heavenly bodies; origin of fire and other stories; names of the islands illustrating migration; political divisions; ethnological notes on Bowditch, Humphreys, Mitchell, Ellice, Tracey, De Peyster, Spieden, Hudson, St. Augustine, Rotch, Hurd, Gilbert, Francis, Netherland, Savage, New Hebrides, Loyalty, New Caledonia and New Guinea islands. One hundred and thirty words are given in the following fifty-nine languages: Marquesas, Tahiti, Hawaii, Raratonga, Manahiki, Samoa, Niué, Fakafo, Tonga, Bau, Rotuma, New Zealand, Aneiteum, Niua, Tanna, Eromanga, Vaté, Nengone, Lifu, New Caledonia, Ebon, Moreton bay, Malayan, Javanese, Bouton, Salayer, Menado, Bolanghitano, Sanguir, Salibabo, Sulu islands, Cajeli, Mayapo, Massaratty, Amblaw, Tidore, Gani, Galela, Liang, Morella, Batumerah, Lariko, Saparua, Awaiya, Caimarian, Teluti, Ahtiago and Tobo, Ahtiago, Gah, Wahai, Matabello, Teor, Mysot, Baju, Dorey, Pt. Moresby, Madagascar.

Whatever other book the ethnographer may have to do without, he cannot afford to deprive himself of this concentrated treatise.

SNAKE DANCE OF THE MOQUIS.—Three years ago, that prince of collectors, Col. James Stevenson, sent to the National Museum a large collection of rudely-carved and painted dolls, wands, head-gear, blankets, rattles and other paraphernalia relating to the Moki sacred dances. Following him, Mr. Cushing, who understands very well the purport of these objects, mounts them for the great exposition at New Orleans; and to cap the climax, Captain John G. Bourke, U.S.A., writes a charming book describing the manners and customs of the Moki, their seven

communal towns perched upon the mesas of Northeastern Arizona, and relates with great minuteness his attendance upon the snake dance, a rite which seemed revolting even to the enthusiastic narrator. Everybody should read the book. We do not know which to praise the most, the author for shaking off the lethargy of camp life and gathering the material, the happy, often frolicsome style in which the work is written, or the beautiful illustrations which throw so much light upon the text. We have only space here to say that in the month of August every year the Moki celebrate a snake dance. Eight days before the dance the young men go north one day, west one day, south one day, east one day, and the other four days they roam all over the country, if necessary, to catch the snakes, using all kinds. These reptiles are placed in an estufa until wanted, kept in order by certain old men who have no other weapon except a small stick, at the end of which are two eagle feathers. The snakes are afraid of the birds of prey, and seem to have a wholesome dread even of their feathers. After the most elaborate preparation, witnessed by Captain Bourke, the dancers march through the principal streets, certain of them carrying each a squirming snake in his mouth, the animal being kept in order by a companion using the eagle-quill teaser. The closing chapters of Captain Bourke's volume are devoted to the daily life and customs of the seven Moki towns.

WHY TROPICAL MAN IS BLACK.—Dr. Nathaniel Alcock contributes to *Nature* a very interesting paper in which he argues that light and actinism have coöperated with heat in the coloring of the skin. If man could live by heat alone, in the tropics the black man would be fittest, because he would be the hottest. But light has also played such an important part that those in whom a portion of the rays of the glaring sun are blocked at the surface are best adapted for survival beneath its vertical beams. The waves of light and heat follow each other at similar rates through the luminiferous ether. When light or heat impinges on man its waves select those atoms whose periods of vibration synchronize with their own period of recurrence, and to such atoms deliver up their motion. It is thus that light and radiant heat are absorbed. Heat waves thus notify their existence along the surface fiber to the central nerve cell, and so enable the animal to avoid their action, if excessive, or seek their increase if deficient. While heat waves are thus received and responded to, their fellow workers, the waves of light, are not inert.

Admitting that theoptic nerves are but nerves of the skin, whose molecules once could vibrate only with the large ultra-red waves of heat, it must be conceded that in the first instance all surface nerves must have felt the influence of that agent by which they are to be hereafter exalted. But a yet more wondrous lesson is to be learned from the steps which nature takes for the

exaltation of a heat-responding nerve into one capable of vibrating in harmony with the shorter waves of light. In the *Euglena viridis* a colorless and transparent area of protoplasm lies in front of the pigment spot, and is the point most sensitive to light. Progressing upward we ever meet with the same arrangement, transparency immediately in front of the part to be exalted, and pigment immediately behind it.

Nature has made the most of her two factors by exposing the selected tissue to the continued impinging of waves of light, at the same time securing not only the transmission through it of the waves of heat, but their constant accumulation behind it, thereby causing the molecular constituents of the protoplasm to be thrown into the highest rates of vibration possible with the means at disposal.

Recognizing the effects of simultaneous light and heat when their influence is concentrated, by a local peculiarity, on a particular part, must it not be evident that in an individual unprotected by hair and unscreened by clothes, living beneath the vertical rays of an equatorial sun, the action of these two forces playing through a transparent skin upon the nerve endings over the entire surface of the body, must be productive of intense, but at the same time disadvantageous nerve vibrations, and that presumably such individuals as were least subject thereto would be best adapted to the surroundings. Nature having learned in ages past that pigment placed behind a transparent nerve will exalt its vibrations to the highest pitch, now proceeds upon the converse reasoning, and placing the pigment in front of the endangered nerve reduces its vibrations by so much as the interrupted light would have excited, a quantity which, though apparently trifling, would, when multiplied by the whole area of the body surface, represent a total of nervous action that if continued would soon exhaust the individual and degrade the species.

Thus it is that man still retains in its full strength the color of skin which, while it aided him materially in his early escape from his enemies, is now continued because it has a more important office to fulfill in warding off the millions of vibrations a second which would otherwise be poured in an uninterrupted stream upon his exposed nervous system.—*Nature*, Aug. 21, '84.

MICROSCOPY.¹

MODERN METHODS OF MICROSCOPICAL RESEARCH.—Microscopical technique has made such rapid progress in the last few years that it has been found necessary to supplement our hand-books of methods through the publication of special journals and departments of journals which undertake to bring together the latest discoveries and improvements. A new and very important line of

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